

14. A powder batch as recited in Claim 13, wherein said particles further comprise a dopant selected from the group consisting of Tb and Cr.

15. A powder batch as recited in Claim 1, wherein said particles comprise  $\text{Zn}_2\text{SiO}_4$ .

5 16. A powder batch as recited in Claim 15, wherein said particles further comprise Mn.

17. A powder batch as recited in Claim 1, wherein said particles comprise  $\text{Y}_2\text{SiO}_5$ .

18. A powder batch as recited in Claim 17, wherein said particles further comprise a dopant selected from the group consisting of Tb and Ce.

10 19. A powder batch as recited in Claim 1, wherein at least about 90 weight percent of said particles are not larger than about two times said average particle size.

20. A powder batch as recited in Claim 1, wherein said phosphor particles comprises crystallites having an average crystallite size of at least about 25 nanometers.

21. A powder batch comprising  $Y_2O_2S$  phosphor particles, wherein said particles have a weight average particle size of from about 0.1  $\mu m$  to about 10  $\mu m$  and have a substantially spherical morphology, wherein at least about 80 weight percent of said particles are not larger than two times said average particle size.

5 22. A powder batch as recited in Claim 21, wherein said particles have a weight average particle size of from about 0.3  $\mu m$  to about 5  $\mu m$ .

23. A powder batch as recited in Claim 21, wherein at least about 90 weight percent of said particles are not larger than two times said average particle size.

10 24. A powder batch as recited in Claim 21, wherein said particles comprise a dopant selected from the group consisting of Eu, Tb and combinations thereof.

25. A powder batch as recited in Claim 21, wherein said particles comprise a dopant selected from the group consisting of Eu, Tb and combinations thereof in a concentration of from about 0.01 to about 10 atomic percent.

45 26. A powder batch as recited in Claim 21, wherein said phosphor particles comprise crystallites having an average crystallite size of at least about 25 nanometers.

27. A powder batch comprising ZnS phosphor particles, wherein said particles have a weight average particle size of from about 0.1  $\mu\text{m}$  to about 10  $\mu\text{m}$  and have a substantially spherical morphology, wherein at least about 80 weight percent of said particles are not larger than two times said average particle size.

5 28. A powder batch as recited in Claim 27, wherein said particles have a weight average particle size of from about 0.3  $\mu\text{m}$  to about 5  $\mu\text{m}$ .

29. A powder batch as recited in Claim 27, wherein at least about 90 weight percent of said particles are not larger than two times said average particle size.

10 30. A powder batch as recited in Claim 27, wherein said particles comprise a dopant selected from the group consisting of Au, Al, Cu, Ag, Cl and combinations thereof.

31. A powder batch as recited in Claim 27, wherein said particles have a dopant concentration of from about  $10^{-5}$  to about  $10^{-3}$  gram-atoms per mole.

32. A powder batch as recited in Claim 27, wherein said phosphor particles comprise crystallites having an average crystallite size of at least about 25 nanometers.

39. A powder batch comprising  $\text{SrGa}_2\text{S}_4$  phosphor particles, wherein said particles have a weight average particle size of from about 0.1  $\mu\text{m}$  to about 10  $\mu\text{m}$  and wherein said particles have a substantially spherical morphology.

40. A powder batch as recited in Claim 39, wherein at least about 80 weight percent of said particles are not larger than two times said average particle size.

41. A powder batch as recited in Claim 39, wherein at least about 90 weight percent of said particles are not larger than two times said average particle size.

42. A powder batch as recited in Claim 39, wherein said particles have a weight average particle size of from about 0.3  $\mu\text{m}$  to about 5  $\mu\text{m}$ .

43. A powder batch as recited in Claim 39, wherein said particles comprise Eu as a dopant.

44. A powder batch as recited in Claim 39, wherein said particles comprise from about 3 to about 8 atomic percent Eu as a dopant.

45. A powder batch as recited in Claim 39, wherein said particles comprise Ce as a dopant.

46. A powder batch as recited in Claim 39, wherein said particles comprise from about 0.5 to about 5 atomic percent Ce as a dopant.

47. A powder batch as recited in Claim 39, wherein said phosphor particles comprise crystallites having an average crystallite size of at least about 25 nanometers.

48. A powder batch comprising  $\text{Zn}_2\text{SiO}_4$  phosphor particles, wherein said particles have an average size of from about 0.1  $\mu\text{m}$  to about 10  $\mu\text{m}$  and wherein said particles have a substantially spherical morphology, wherein at least about 80 weight percent of said particles are not larger than two times said average particle size.

5 49. A powder batch as recited in Claim 48, wherein said particles have a weight average particle size of from about 0.3  $\mu\text{m}$  to about 5  $\mu\text{m}$ .

50. A powder batch as recited in Claim 48, wherein at least about 90 weight percent of said particles are not larger than two times said average particle size.

10 51. A powder batch as recited in Claim 48, wherein said particles comprise Mn as a dopant.

52. A powder batch as recited in Claim 48, wherein said particles comprise from about 0.05 to about 2 atomic percent Mn as a dopant.

53. A powder batch as recited in Claim 48, wherein said phosphor particles comprise crystallites having an average crystallite size of at least about 25 nanometers.

59. A powder batch comprising  $Y_5(Ga,Al)_5O_{12}$  phosphor particles, wherein said particles have an average size of from about 0.1  $\mu m$  to about 10  $\mu m$  and wherein said particles have a substantially spherical morphology, wherein at least about 80 weight percent of said particles are not larger than two times said average particle size.

5 60. A powder batch as recited in Claim 59, wherein said particles have a weight average particle size of from about 0.3  $\mu m$  to about 5  $\mu m$ .

61. A powder batch as recited in Claim 59, wherein at least about 90 weight percent of said particles are not larger than two times said average particle size.

10 62. A powder batch as recited in Claim 59, wherein said particles comprise Tb as a dopant.

63. A powder batch as recited in Claim 59, wherein said phosphor particles comprise crystallites having an average crystallite size of at least about 25 nanometers.

64. A flowable medium suitable for applying cathodoluminescent phosphor particles onto a substrate, comprising:

a) a liquid vehicle phase; and

b) a functional phase dispersed throughout said liquid vehicle phase, said functional phase comprising cathodoluminescent phosphor particles having a substantially spherical morphology and a weight average particle size of not greater than about 5  $\mu\text{m}$ .

65. A flowable medium as recited in Claim 64, wherein said phosphor particles have a particle size distribution wherein at least about 80 weight percent of said phosphor particles are not larger than twice said average particle size.

66. A flowable medium as recited in Claim 64, wherein said phosphor particles have a particle size distribution wherein at least about 90 weight percent of said phosphor particles are not larger than twice said average particle size.

67. A flowable medium as recited in Claim 64, wherein said vehicle phase is an aqueous-based solution.

68. A flowable medium as recited in Claim 64, wherein said vehicle phase is an aqueous-based solution comprising a dispersing agent.

69. A flowable medium as recited in Claim 64, wherein said flowable medium comprises from about 5 to about 95 weight percent of said cathodoluminescent phosphor particles.

70. A flowable medium as recited in Claim 64, wherein said flowable medium comprises from about 60 to about 85 weight percent of said cathodoluminescent phosphor particles.

71. A flowable medium as recited in Claim 64, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_3$ .

72. A flowable medium as recited in Claim 64, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_2\text{S}$ .

80. A cathodoluminescent device, comprising:

a) an excitation source; and

b) at least a first layer of cathodoluminescent phosphor particles adapted to be stimulated by said excitation source, wherein said phosphor particles have a weight average particle size of from about 0.1  $\mu\text{m}$  to about 10  $\mu\text{m}$ , a substantially spherical morphology and wherein at least about 80 weight percent of said particles are not larger than about two times said average particle size.

81. A cathodoluminescent device as recited in Claim 80, wherein said phosphor particles have a weight average particle size of from about 0.3  $\mu\text{m}$  to about 5  $\mu\text{m}$ .

82. A cathodoluminescent device as recited in Claim 80, wherein said excitation source has an excitation potential of not greater than about 5 kV.

83. A cathodoluminescent device as recited in Claim 80, wherein said excitation source has an excitation potential of at least about 5 kV.

84. A cathodoluminescent device as recited in Claim 80, wherein said excitation source has an excitation potential of at least about 20 kV.

85. A cathodoluminescent device as recited in Claim 80, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_3:\text{Eu}$ .

86. A cathodoluminescent device as recited in Claim 80, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_2\text{S}:\text{Eu}$ .

87. A cathodoluminescent device as recited in Claim 80, wherein said phosphor particles comprise ZnS and a dopant selected from the group consisting of Au, Al, Cu, Ag, Cl and combinations thereof.

88. A cathodoluminescent device as recited in Claim 80, wherein said particles comprise  $\text{Zn}_2\text{SiO}_4:\text{Mn}$ .

89. A cathodoluminescent device as recited in Claim 80, wherein said particles comprise  $\text{Y}_5(\text{Ga},\text{Al})_5\text{O}_{12}:\text{Tb}$ .

90. A cathodoluminescent device as recited in Claim 80, wherein said particles comprise  $\text{SrGa}_2\text{S}_4$  and a dopant selected from the group consisting of Eu and Ce.

91. A cathodoluminescent device as recited in Claim 80, wherein said particles comprise  $\text{Y}_2\text{SiO}_5$  and a dopant selected from the group consisting of Tb and Ce.



73. A flowable medium as recited in Claim 64, wherein said phosphor particles comprise ZnS.

74. A flowable medium as recited in Claim 64, wherein said phosphor particles comprise  $\text{SrGa}_2\text{S}_4$ .

5 75. A flowable medium as recited in Claim 64, wherein said phosphor particles comprise  $\text{Y}_5(\text{Ga,Al})_5\text{O}_{12}$ .

76. A flowable medium as recited in Claim 64, wherein said phosphor particles comprise  $\text{Zn}_2\text{SiO}_4$ .

10 77. A flowable medium as recited in Claim 64, wherein said phosphor particles comprise  $\text{Y}_2\text{SiO}_5$ .

78. A paste composition suitable for applying cathodoluminescent phosphor particles onto a substrate, comprising:

a) a liquid vehicle phase; and

5 b) a functional phase dispersed throughout said vehicle phase, said functional phase comprising substantially spherical cathodoluminescent phosphor particles having a weight average particle size of not greater than about 5  $\mu\text{m}$  and a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.

79. A paste composition as recited in Claim 78, wherein at least about 90 weight  
10 percent of said particles are not larger than twice said average particle size.

92. A cathodoluminescent device as recited in Claim 80, wherein said device is a field emission display.

93. A cathodoluminescent device as recited in Claim 80, wherein said device is a CRT.

5 94. A cathodoluminescent device as recited in Claim 80, wherein said device is a projection CRT.

95. A cathodoluminescent device as recited in Claim 80, wherein said device is a heads-up display.

10 96. A cathodoluminescent device as recited in Claim 80, wherein said device is a heads-down display.

97. A cathodoluminescent display device, comprising:

a) an excitation source having an excitation potential of not greater than about 5 kV; and

b) at least a first layer of cathodoluminescent phosphor particles adapted to be stimulated by said excitation source, wherein said phosphor particles have a weight average particle size of from about 0.1  $\mu\text{m}$  to about 10  $\mu\text{m}$ , a substantially spherical morphology and wherein at least about 80 weight percent of said particles are not larger than about two times said average particle size.

98. A cathodoluminescent display device as recited in Claim 97, wherein said phosphor particles have a weight average particle size of from about 0.3  $\mu\text{m}$  to about 5  $\mu\text{m}$ .

99. A cathodoluminescent display device as recited in Claim 97, wherein said particles comprise  $\text{Y}_2\text{O}_3$  and from about 4 to about 6 atomic percent Eu.

100. A cathodoluminescent display device as recited in Claim 97, wherein said particles comprise  $\text{Zn}_2\text{SiO}_4$  and from about 0.05 to about 2 atomic percent Mn.

101. A cathodoluminescent device as recited in Claim 97, wherein said particles comprise  $\text{Y}_2\text{SiO}_5$  and a dopant selected from the group consisting of Tb and Ce.

102. A cathodoluminescent device as recited in Claim 97, wherein said particles comprise  $\text{SrGa}_2\text{S}_4$  and a dopant selected from the group consisting of Eu and Ce.

103. A cathodoluminescent display device as recited in Claim 97, wherein said device is a field emission display.

104. A cathodoluminescent display device, comprising:

a) an excitation source having an excitation potential of at least about 20 kV; and

b) at least a first layer of cathodoluminescent phosphor particles adapted to be stimulated by said excitation source, wherein said phosphor particles have a weight average particle size of from about 0.1  $\mu\text{m}$  to about 10  $\mu\text{m}$ , a substantially spherical morphology and wherein at least about 80 weight percent of said particles are not larger than about two times said average particle size.

105. A cathodoluminescent display device as recited in Claim 104, wherein said phosphor particles have an average size of from about 0.1  $\mu\text{m}$  to about 5  $\mu\text{m}$ .

106. A cathodoluminescent display device as recited in Claim 104, wherein at least about 90 weight percent of said particles are not larger than about two times said average particle size.

107. A cathodoluminescent display device as recited in Claim 104, wherein said particles comprise  $\text{Y}_2\text{O}_3$  and from about 4 to about 6 atomic percent Eu.

108. A cathodoluminescent display device as recited in Claim 104, wherein said particles comprise  $\text{Zn}_2\text{SiO}_4$  and from about 0.05 to about 2 atomic percent Mn.

109. A cathodoluminescent display device as recited in Claim 104, wherein said device is a CRT.

110. A cathodoluminescent display device as recited in Claim 104, wherein said device is a projection CRT.

111. A cathodoluminescent display device as recited in Claim 104, wherein said device is a heads-down display.

112. A cathodoluminescent display device as recited in Claim 104, wherein said device is a heads-up display.

113. A field emission display, comprising:

- (a) a back plate portion comprising a plurality of electron tip emitters;
- (b) a transparent front plate portion comprising a layer of phosphor

powder comprising substantially spherical cathodoluminescent phosphor particles, wherein said phosphor particles have a weight average particle size of not greater than about 5  $\mu\text{m}$  and a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.

114. A field emission display as recited in Claim 113, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_3$ .

115. A field emission display as recited in Claim 113, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_3$  and from about 4 to about 6 atomic percent Eu.

116. A field emission display as recited in Claim 113, wherein said phosphor particles comprise  $\text{Y}_2\text{SiO}_5$ .

117. A field emission display as recited in Claim 113, wherein said phosphor particles comprise  $\text{Y}_2\text{SiO}_5$  and from about 5 to about 20 atomic percent Tb as a dopant.

118. A field emission display as recited in Claim 113, wherein said phosphor particles comprise  $\text{Y}_2\text{SiO}_5$  and from about 0.05 to about 5 atomic percent Ce as a dopant.

119. A field emission display as recited in Claim 113, wherein said phosphor particles comprise  $\text{SrGa}_2\text{S}_4$  and a dopant selected from the group consisting of Eu and Ce.

120. A field emission display as recited in Claim 113, wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

121. A field emission display as recited in Claim 113, wherein said phosphor particles have a substantially spherical morphology.

122. A field emission display as recited in Claim 113, wherein said phosphor particles form a pixel layer having an average thickness of not greater than about three times said average particle size.

123. A field emission display as recited in Claim 113, wherein said phosphor particles are coated phosphor particles comprising a coating substantially encapsulating said particles.

124. A CRT display device, comprising:

(a) an excitation source comprising an electron emitter;

(b) a transparent front plate portion comprising a layer of phosphor powder comprising substantially spherical cathodoluminescent phosphor particles, wherein said phosphor particles have a weight average particle size of not greater than about 5  $\mu\text{m}$  and a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.

125. A CRT display device as recited in Claim 124, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_2\text{S}$ .

126. A CRT display device as recited in Claim 124, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_2\text{S}$  and a dopant selected from the group consisting of Eu, Tb and combinations thereof.

127. A CRT display device as recited in Claim 124, wherein said phosphor particles comprise ZnS.

128. A CRT display device as recited in Claim 124, wherein said phosphor particles comprise ZnS and a dopant selected from the group consisting of Au, Al, Ag, Cl, Cu and combinations thereof.

129. A CRT display device as recited in Claim 124, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_3$ .

130. A CRT display device as recited in Claim 124, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_3:\text{Eu}$ .

131. A CRT display device as recited in Claim 124, wherein said phosphor particles comprise  $\text{SrGa}_2\text{S}_4$ .

132. A CRT display device as recited in Claim 124, wherein said phosphor particles comprise  $\text{SrGa}_2\text{S}_4:\text{Eu}$ .

133. A CRT display device as recited in Claim 124, wherein said particles comprise  $\text{Y}_2\text{SiO}_5$  and a dopant selected from the group consisting of Tb and Ce.

134. A CRT display device as recited in Claim 124, wherein said particles comprise  $\text{Y}_5(\text{Ga},\text{Al})_5\text{O}_{12}:\text{Tb}$ .

135. A CRT display device as recited in Claim 124, wherein said weight average

particle size is from about 0.3  $\mu\text{m}$  to about 3  $\mu\text{m}$ .

136. A CRT display device as recited in Claim 124, wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

137. A CRT display device as recited in Claim 124, wherein said phosphor  
5 particles form a pixel layer having an average thickness of not greater than about three times said average particle size.



138. A projection CRT display device, comprising:

- a) a cathodoluminescent excitation source;
- b) a display screen; and
- c) a phosphor layer disposed between said excitation source and said

display screen, wherein said phosphor layer comprises substantially spherical cathodoluminescent phosphor particles, wherein said phosphor particles have a weight average particle size of not greater than about 5  $\mu\text{m}$  and a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.

139. A projection CRT as recited in Claim 138, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_3:\text{Eu}$ .

140. A projection CRT as recited in Claim 138, wherein said phosphor particles comprise  $\text{Y}_2\text{O}_2\text{S}:\text{Eu}$ .

141. A projection CRT as recited in Claim 138, wherein said phosphor particles comprise  $\text{Zn}_2\text{SiO}_4$ .

142. A projection CRT as recited in Claim 138, wherein said phosphor particles comprise crystallites having an average crystallite size of at least about 25 nanometers.

143. A method for the production of a cathodoluminescent phosphor powder, comprising the steps of:

a) forming a liquid comprising precursors to a cathodoluminescent phosphor compound;

5 b) generating an aerosol of droplets from said liquid;

c) pyrolyzing said droplets to remove liquid therefrom and form intermediate precursor particles; and

d) heating said intermediate precursor particles to form a powder batch of phosphor particles.

10 144. A method as recited in Claim 143, wherein said liquid comprises a particulate precursor.

145. A method as recited in Claim 143, wherein said step of generating an aerosol comprises the step of ultrasonically atomizing said liquid.

15 146. A method as recited in Claim 143, wherein said pyrolyzing step comprises pyrolyzing said droplets at a temperature of at least about 700°C.

147. A method as recited in Claim 143, wherein said heating step comprises heating to a temperature of from about 1100°C to about 1600°C.

148. A method as recited in Claim 143, wherein said heating step comprises the step of heating said intermediate precursor particles with agitation.

20 149. A method as recited in Claim 143, wherein said heating step comprises the step of heating said intermediate precursor particles with sufficient agitation to substantially prevent the formation of hard agglomerates in the phosphor powder.

150. A method as recited in Claim 143, wherein said heating step comprises heating said intermediate precursor particles in a rotary kiln.

25 151. A method as recited in Claim 143, wherein said intermediate precursor particles have an average particle size that is not greater than about 5 µm.

155. A method for the production of a  $Y_2O_3$  phosphor powder, comprising the steps of:

a) forming a liquid comprising precursors to a  $Y_2O_3$  cathodoluminescent phosphor compound;

5 b) generating an aerosol of droplets from said liquid;

c) pyrolyzing said droplets to remove liquid therefrom and form intermediate precursor particles; and

d) heating said intermediate precursor particles to form a powder batch of phosphor particles.

10 156. A method as recited in Claim 155, wherein said precursors comprise yttrium nitrate.

157. A method as recited in Claim 155, wherein said phosphor particles further comprise Eu.

158. A method as recited in Claim 155, wherein said precursor comprises europium nitrate.

159. A method as recited in Claim 155, wherein said liquid comprises from about 4 to about 6 weight percent precursors.

160. A method as recited in Claim 155, wherein said step of generating an aerosol comprises the step of ultrasonically atomizing said liquid.

20 161. A method as recited in Claim 155, wherein said pyrolyzing step comprises pyrolyzing said droplets at a temperature of from about 850°C to about 1000°C.

162. A method as recited in Claim 155, wherein said heating step comprises heating to a temperature of from about 1350°C to about 1500°C.

25 163. A method as recited in Claim 155, wherein said heating step comprises the step of heating said intermediate precursor particles with agitation.

164. A method as recited in Claim 155, wherein said heating step comprises the

step of heating said intermediate precursor particles with sufficient agitation to substantially prevent the formation of hard agglomerates in the phosphor powder.

165. A method as recited in Claim 155, wherein said heating step comprises heating said intermediate precursor particles in a rotary kiln.

5 166. A method as recited in Claim 155, wherein said intermediate precursor particles have an average particle size that is not greater than about 5  $\mu\text{m}$ .

167. A method as recited in Claim 155, wherein no more than about 0.1 weight percent of said phosphor particles are in the form of hard agglomerates.

10 168. A method as recited in Claim 155, wherein said phosphor particles have an average particle size of not greater than about 5  $\mu\text{m}$  and wherein said particles have not been milled.

169. A method as recited in Claim 155, further comprising the step of adding water during said step of generating an aerosol to maintain the precursor concentration below a predetermined value.

170. A method for the production of a  $\text{Zn}_2\text{SiO}_4$  phosphor powder, comprising the steps of:

a) forming a liquid comprising precursors to a  $\text{Zn}_2\text{SiO}_4$  cathodoluminescent phosphor compound;

5 b) generating an aerosol of droplets from said liquid;

c) pyrolyzing said droplets to remove liquid therefrom and form intermediate precursor particles; and

d) heating said intermediate precursor particles to form a powder batch of phosphor particles.

10 171. A method as recited in Claim 170, wherein said precursors comprise particulate silica.

172. A method as recited in Claim 170, wherein said precursors comprise zinc nitrate.

15 173. A method as recited in Claim 170, wherein said precursors comprise an excess of silica.

174. A method as recited in Claim 170, wherein said precursors comprise at least about 10 atomic percent excess silica.

175. A method as recited in Claim 170, wherein said phosphor particles further comprise Mn.

20 176. A method as recited in Claim 170, wherein said precursor comprises manganese nitrate.

177. A method as recited in Claim 170, wherein said step of generating an aerosol comprises the step of ultrasonically atomizing said liquid.

25 178. A method as recited in Claim 170, wherein said pyrolyzing step comprises pyrolyzing said droplets at a temperature of from about  $850^\circ\text{C}$  to about  $1000^\circ\text{C}$ .

179. A method as recited in Claim 170, wherein said heating step comprises

heating to a temperature of from about 1100°C to about 1200°C.

180. A method as recited in Claim 170, wherein said heating step comprises the step of heating said intermediate precursor particles with agitation.

5 181. A method as recited in Claim 170, wherein said heating step comprises the step of heating said intermediate precursor particles with sufficient agitation to substantially prevent the formation of hard agglomerates in the phosphor powder.

182. A method as recited in Claim 170, wherein said heating step comprises heating said intermediate precursor particles in a rotary kiln.

10 183. A method as recited in Claim 170, wherein said intermediate precursor particles have an average particle size that is not greater than about 5 µm.

184. A method as recited in Claim 170, wherein no more than about 0.1 weight percent of said phosphor particles are in the form of hard agglomerates.

15 185. A method as recited in Claim 170, wherein said phosphor particles have an average particle size of not greater than about 5 µm and wherein said particles have not been milled.

186. A method as recited in Claim 170, further comprising the step of adding water during said step of generating an aerosol to maintain the precursor concentration below a predetermined value.

187. A method for the production of a ZnS phosphor powder batch, comprising the steps of:

a) forming a liquid comprising precursors to a ZnS cathodoluminescent phosphor compound;

b) generating an aerosol of droplets from said liquid;

c) pyrolyzing said droplets to remove liquid therefrom and form intermediate precursor particles; and

d) heating said intermediate precursor particles to form a powder batch of phosphor particles.

188. A method as recited in Claim 187, wherein said precursors comprise zinc nitrate.

189. A method as recited in Claim 187, wherein said precursors comprise thiourea.

190. A method as recited in Claim 187, wherein said step of generating an aerosol comprises the step of ultrasonically atomizing said liquid.

191. A method as recited in Claim 187, wherein said pyrolyzing step comprises pyrolyzing said droplets at a temperature of from about 300°C to about 900°C.

192. A method as recited in Claim 187, wherein said heating step comprises heating to a temperature of from about 500°C to about 900°C.

193. A method as recited in Claim 187, wherein said heating step comprises the step of heating said intermediate precursor particles with agitation.

194. A method as recited in Claim 187, wherein said heating step comprises the step of heating said intermediate precursor particles with sufficient agitation to substantially prevent the formation of hard agglomerates in the phosphor powder.

195. A method as recited in Claim 187, wherein said heating step comprises heating said intermediate precursor particles in a rotary kiln.

196. A method as recited in Claim 187, wherein said intermediate precursor

particles have an average particle size that is not greater than about 5  $\mu\text{m}$ .

197. A method as recited in Claim 187, wherein no more than about 0.1 weight percent of said phosphor particles are in the form of hard agglomerates.

198. A method as recited in Claim 187, wherein said phosphor particles have an  
5 average particle size of not greater than about 5  $\mu\text{m}$  and wherein said particles have not been milled.

199. A method as recited in Claim 187, further comprising the step of adding water during said step of generating an aerosol to maintain the precursor concentration below a predetermined value.



200. A method for the production of a  $\text{SrGa}_2\text{S}_4$  phosphor powder batch, comprising the steps of:

a) forming a liquid comprising precursors to a  $\text{SrGa}_2\text{S}_4$  cathodoluminescent phosphor compound;

5 b) generating an aerosol of droplets from said liquid;

c) pyrolyzing said droplets to remove liquid therefrom and form intermediate precursor particles; and

d) heating said intermediate precursor particles to form a powder batch of phosphor particles.

10 201. A method as recited in Claim 200, wherein said step of generating an aerosol comprises the step of ultrasonically atomizing said liquid.

202. A method as recited in Claim 200, wherein said pyrolyzing step comprises pyrolyzing said droplets at a temperature of from about  $700^\circ\text{C}$  to about  $900^\circ\text{C}$ .

15 203. A method as recited in Claim 200, wherein said heating step comprises heating to a temperature of from about  $800^\circ\text{C}$  to about  $1100^\circ\text{C}$ .

204. A method as recited in Claim 200, wherein said heating step comprises heating said intermediate precursor particles in a gas composition comprising  $\text{H}_2\text{S}$  gas.

205. A method as recited in Claim 200, wherein said heating step comprises the step of heating said intermediate precursor particles with agitation.

20 206. A method as recited in Claim 200, wherein said heating step comprises the step of heating said intermediate precursor particles with sufficient agitation to substantially prevent the formation of hard agglomerates in the phosphor powder.

207. A method as recited in Claim 200, wherein said heating step comprises heating said intermediate precursor particles in a rotary kiln.

25 208. A method as recited in Claim 200, wherein said intermediate precursor particles have an average particle size that is not greater than about  $5\text{ }\mu\text{m}$ .

209. A method as recited in Claim 200, wherein no more than about 0.1 weight percent of said phosphor particles are in the form of hard agglomerates.

210. A method as recited in Claim 200, wherein said phosphor particles have an average particle size of not greater than about 5  $\mu\text{m}$  and wherein said particles have not  
5 been milled.

211. A method as recited in Claim 200, further comprising the step of adding water during said step of generating an aerosol to maintain the precursor concentration below a predetermined value.